BULLETIN

OF THE

Society for the Promotion of Engineering Education

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EDITORIALS.

The Minneapolis Meeting.—The Society began its twentieth year of activity with a meeting notable for the substantial content of the papers presented and by the enthusiasm with which these papers were discussed. Teachers of engineering and allied subjects take their vocation seriously, as was evident from the large attendance at all sessions of the meeting. Moreover the finish was stronger than the start, reversing the usual tendency of technical and other meetings. In spite of the attractions of the surroundings, the heat and the natural desire to "visit," every session was well attended. There was no lack of discussion, much of it evidently based on careful advance meditation. The general testimony was "we have had a good meeting." One of the younger men remarked, "I was in much doubt as to the wisdom of coming so far and spending so much, but I am delighted that I did so and I shall be on hand at future meetings." A hundred others felt likewise.

What Constitutes a Good Teacher?—President Magruder's address is printed in this issue. It will furnish food for thought for every member. Each teacher will try to measure himself by the pedagogical yardstick furnished in the paper and all members will be inspired with increased respect for the great and good teachers who have influenced them.

"What, after all, is education for?" is the question which the instructor must ask himself frequently and seriously. All will agree on three purposes—to enable the student to support himself, to enrich his life, and to prepare him for the most efficient social service. A true education produces these fruits in the natural order given, one result following the other as a natural consequence. The true teacher is looking to the final result and is inspiring his disciples to do the same. The teacher's ideals are finally realized in their useful lives. "By their fruits ye shall know them."

What Students Want.—The axioms stated above are sound and comprehensive. The practical problem is how to make

the fundamental laws effective. The first requisite is that the teacher must have something that the pupils want or can be made to want. It is not enough that they need it, a *need* is not a *want* until it is realized. To want a thing implies a desire to use it. To make another person want a thing involves an appreciation on the teacher's part of what the thing is good for. This appreciation must have come from experience or from very close observation of the thing in action. Take, for example, the subject of stenography. A good teacher of this subject is a good man and a good stenographer who has learned, somehow, that stenography is a pleasant means of livelihood and that *first-class* stenographers are good citizens. Further he believes that any earnest student can be made better by this study whether or not he becomes a "professional." This knowledge and belief, coupled with a natural or cultivated liking for young people, make him a successful teacher.

Difficulties in Technical Teaching.—A good teacher has many difficulties to overcome. In schools of considerable size, and this includes most of the technical schools, much of the teaching must be done by young instructors who very properly look upon teaching as a temporary occupation just as do many young women in public school work. These have not time to get the true view-point of the teacher by experience. The older men must somehow inspire them. This society should be another source of information and suggestion. Another obstacle to be overcome is the failure of the students to know what "they're driving at." Once they have in mind the real and ultimate purpose of their education their coöperation is assured. Given teacher and pupil who have a common aim and *who know what that aim is* and there is no chance of failure.

NEW MEMBERS.

The following were elected to membership at the Minneapolis meeting in addition to those listed in recent numbers of the BULLETIN.

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NEW MEMBERS.

ACKER, M. W., Director of Machine Shop, David Ranken, Jr., School of Mechanical Trades, St. Louis, Mo. 1913

APPLEBY, W. R., Dean of the Minnesota School of Mines and Professor of Metallurgy, University of Minnesota, Minneapolis, Minn. 1913

BALDWIN, A. T., President and Manager, Precision Instrument Co., 102 Randolph St., Detroit, Mich. 1913

BENEDICT, H. G., Consulting Management Engineer, P. O. Box 475, Hornell, N. Y. 1913

BRIGGS, O. P., Vice-President, Wilcox Motor Car Co., 2629 Lake of Isles Blvd., Minneapolis, Minn. 1913

Bruce, S. S., Professor of Metallurgy and Ore Dressing, Michigan College of Mines, Houghton, Mich. 1913

COOK, A. L., Head of the Dept. of Applied Electricity, Pratt Institute, Brooklyn, N. Y. 1913

COOK, ROBERTSON, Professor of Experimental Engineering, South Dakota State College, Brookings, S. D. 1913

COOMBS, S. E., Assistant Engineer, N. Y. C. & H. R. R. R. and Instructor in Mechanical Drawing, New York Evening High School for Men, 65 Elliott Ave., Yonkers, N. Y. 1913

CROWE, C. P., Instructor in Industrial Arts, The Ohio State University, Columbus, O. 1913

DADOURIAN, H. M., Instructor of Physics, Sheffield Scientific School, Yale University, New Haven, Conn. 1913

EDWARDS, W. W., Instructor in Applied Mechanics, Wentworth Institute, Boston, Mass. 1913

FOULK, C. W., Professor of Chemistry, The Ohio State University, Columbus, O. 1913

HATJIDAKIS, GEORGE, Piraeus, Greece 1913

JOHNSON, E. A., Head of the Foundry Dept., Wentworth Institute, Boston, Mass. 1913

KELLOGG, E. W., Instructor in Electrical Engineering, University of Missouri, Columbia, Mo. 1913

KERSHAW, W. H., Chief Engineer, The Texas Co., Paving and Road Dept., New York City. 1913

LAUER, H. H., Instructor in Mining Dept., University of Illinois, Urbana, Ill. 1913

LEWIS, J. F., Instructor of Mechanics of Materials, Pennsylvania State College, State College, Pa. 1913

LEWIS, O. L., Supt. of Shops, Highland Park College, Des Moines, Iowa. 1913

MARTIN, W. H., Instructor in Mechanical Engineering, University of Minnesota, Minneapolis, Minn. 1913

NEW MEMBERS.

MATHEWSON, F. E., Director, Technical and Industrial Dept., Wm. L. Dickinson High School, Jersey City, N. J. 1913

MUNRO, A. R., Senior Demonstrator in Engineering, University of Queensland, Brisbane, Australia 1913

PERRY, W. H., Instructor in Applied Science, Wentworth Institute, Boston, Mass. 1913

PINTO, ANTHONY, Instructor in Electrical and Mechanical Engineering, Cooper Union, New York, N. Y. 1913

RAMSOWER, H. C., Assistant Professor of Agronomy, The Ohio State University, Columbus, O. 1913

ROBBINS, F. A., Assistant Professor in Electrical Engineering, Iowa State College, Ames, Ia. 1913

ROBERTSON, J. E., Professor of Mathematics, Highland Park College, Des Moines, Ia. 1913

SCHALFLY, R. K., Assistant Professor of Civil Engineering, The Ohio State University, Columbus, O. 1913

STONE, J. F., Trustee, The Ohio State University, Columbus, O. .. 1913

THOMAS, H. A., Associate Professor of Civil Engineering, Rose Polytechnic Institute, Terre Haute, Ind. 1913

TODD, M. E., Instructor in Electrical Engineering, North Dakota State Science School, Wahpeton, N. D. 1913

VON RITTER, ALEXANDER, Assistant Professor in Mechanical Engineering, University of Pittsburgh, Pittsburgh, Pa. 1913

WILLIAMS, W. S., Associate Professor of Topographical Engineering, University of Missouri, Columbia, Mo. 1913

WILLSON, F. N., Professor of Graphics, Princeton University, Princeton, N. J. 1913

The following were elected by Council letter ballot, August 1.

BALDWIN, G. J., Trustee of Georgia School of Technology, 225 Hall St., E., Savannah, Ga. 1913

DEMOREST, D. J., Assistant Professor of Metallurgy and Mineralogy, The Ohio State University, Columbus, O. 1913

SEELY, F. B., Instructor in Theoretical and Applied Mechanics, University of Illinois, Urbana, Ill. 1913

TURNER, C. A. P., Engineer, 2675 Lake of Isles Blvd., Minneapolis, Minn. 1913

APPLICANTS FOR MEMBERSHIP.

FINCH, F. R., Instructor in Descriptive Geometry and Drawing, University of Michigan, Ann Arbor, Mich. 1913

KOSTALEK, J. A., Assistant Professor of Chemistry, University of Idaho, Moscow, Ida. 1913

SOCIETY BUSINESS.

In June President Wm. T. Magruder appointed the following Committee on Secondary Schools: H. E. Webb, Chairman, H. T. Clifton, L. F. Rondinella. This committee is planning to interest teachers in technical high schools in the work of the Society and to study the relation of these schools to the technical colleges.

CONVENTIONALITIES.

The paper by Mr. Chas. Henry Davis entitled "Prospective Opportunities for Highway Engineers in a National Highway Department" was privately printed by Mr. Davis and distributed widely.

The paper by Mr. Ivy L. Lee on "How Can the Colleges and the Industries Coöperate?" was published by the Pennsylvania R. R. Co. since the convention and distributed to all persons interested.

The paper by Mr. E. D. Sabine on the same topic as that treated by Mr. Lee was received too late for presentation at the meeting. It will appear in an early number of the BULLETIN.

The paper by Hon. P. P. Claxton was not presented, as illness in Mr. Claxton's family prevented him from completing it in time.

The heat experienced during the two days of the convention reminded the members of the recent New York and Madison meetings. Temperature is not a function of latitude but rather of the whims of the elements. Obviously, the latitude need not be considered in selecting a location for the annual meting.

The boat ride on Lake Minnetonka, with the dinner at the Lafayette Country Club, recalled to the minds of the members

the trip on Lake Mendota at Madison. The latter was also followed by a dinner at the country club after which President Van Hise delivered his memorable address on the "Conservation of Our Natural Resources."

The exhibits of instruments and of books which formed a novel feature of the Minneapolis meeting proved a source of information to the members who had time to study them. The exhibitors spent large sums and considerable ingenuity in connection with their exhibits and it is to be hoped that the results were satisfactory to them. The exhibit feature was carried out under the direction of Professor G. D. Shepardson.

The new engineering library room formed a most delightful meeting place for the Society. The beauty of the room will long remain in the memory of those who sat therein during the sessions of the convention.

In spite of the rain the automobile ride provided by the fortunate possessors of these useful vehicles, presumably not teachers, was a great success. The elaborate park system of Minneapolis and St. Paul was a surprise to most of the visitors. They were pleased to note that the twin cities have "buried the hatchet" and the high dam is being constructed to provide water transportation to the heart of Minneapolis.

The car service of the Twin City Rapid Transit Company came in for a share of admiration from the visitors. The platform gates of novel construction rendered the lives of the country members entirely safe. The high speed suburban ride to Lake Minnetonka was quite thrilling.

President Hill of the University of Missouri was very proud of his delegation of six members representing, probably, the largest delegation mileage.

The convention photograph, a new feature, was greatly appreciated. Copies of the panoramic view can be obtained for $1.50 from Camera Craft Co., Minneapolis.

President Magruder tried to impress on everyone the duty of being sociable. A special effort was made to get all of the attendants acquainted. This effort was crystallized in the formation on the new committee on sociability which will begin operations at Princeton. Members of the committee will be provided with special badges. If any member or guest goes home without meeting everyone else it will not be the fault of the committee.

The late arrival of programs and badges threatened to reduce the efficiency of the meeting somewhat. The Secretary states that he supposed ample time had been allowed for their transportation and that this accident will not occur again.

What the Convention Did for Me.

The thing that I enjoyed most was meeting old friends and becoming acquainted with several new men who are engaged in my own line of work. Talking over problems of teaching in an informal way with these at odd times was very helpful.—Brackett.

It enabled me to be of service to others, to get others together for their personal and general benefit, to promote good fellowship and the cause of engineering, to meet old friends and make new acquaintances.—Magruder.

It impressed upon me the advantage to the graduate of closer coöperation between the developers and the users of the product of our technical schools.—Dietz.

Increased enthusiasm. Extended acquaintance. Renewed friendships. Exalted appreciation of the profession. Broadened view of engineering education. Gave new ideas, thoughts, notions, "kinks," insight, vision. And finally it served as a sort of "pop" valve for one's own thoughts.—Chatburn.

The convention, aside from interesting papers and discussions, afforded an opportunity for meeting old friends and making new ones.—Hedrick.

The greatest benefit which I derived from the recent S. P. E. E. convention held here was in the discussion of those problems which interest me most, with others who are teaching similar subjects.

I am sure much benefit could be derived by the younger members if "round table" meetings could be arranged.—Martenis.

Visits with old friends, opportunity of making new ones, seeing or meeting strangers coupled with the after satisfaction of better understanding what they say or write.—Springer.

I was pleased to learn that our method of teaching shop work in the University of Minnesota compares favorably with those of other universities which favor teaching commercial shop practice.—W. H. Richards.

The convention proper was a veritable encyclopedia of information and a source of inspiration for me. The social features added a touch of vacation life which I appreciated greatly.—Mickey.

OTHER PERIODICALS.

The Minneapolis Journal keeps its readers well informed regarding University news. In recent issues it devoted considerable space to the new commercial school of the University of Minnesota, stating that the banks, factories and stores are to be made the laboratories for practical application of business theories. The paper seems to be much interested in the extension work of the University.

The February **American Mathematical Monthly** contained an article on Minimum Courses in Engineering Mathematics by Professor S. Epsteen. If possible, this paper will be reprinted in an early number of the BULLETIN.

The June **Mathematics Teacher** contained an interesting article by Dr. S. A. Moss, a member of this society, on mathematics teaching. Dr. Moss has promised to rewrite this article for the BULLETIN, adapting his ideas to more advanced teaching.

The July **Electrical Engineering** (formerly the Southern Electrician) contained a number of articles of interest to laboratory instructors. Among these are articles on tests on rotary converters and furnace losses and functions of the boiler.

Reviews of Part I of Vol. 20 of the Proceedings appeared in a number of the current periodicals. The **Journal of the Efficiency Society,** June, p. 14, contains a brief note. **Engineering News** of July contains an extensive review in which the editor of the Society is criticized for the presence of some papers not exactly in line with the topic. It should be said, however, that it was difficult to choose a title which would be brief and comprehensive. The Editor takes malicious pleasure in calling attention to a large number of typographical errors in the review. The July **Industrial Engineering** gives a full list of the papers forming the efficiency symposium together with editorial comment.

The May **Technology Review** (M. I. T.) contains the recommendations of the Alumni Committee on Student Housing. This is a lengthy report taking up the following phases of the subject: Statement of the general problem and local conditions, possible location of dormitories, dormitory details, including social and financial features, dining room details, fraternities and clubs.

The April **Ohio State University Quarterly** contains an interesting account of Summer Surveying in Yellowstone National Park by Professor Sherman, and the **Ohio State**

Journal for July 1 gives some space to the activities of the Ohio State University students under Professors Sherman, Eno and Schlafly in the work of flood prevention.

LETTERS TO THE EDITOR.

EDITOR, S. P. E. E. BULLETIN,

Dear Sir: I regret to note an unfortunate error in the last paragraph of my article on p. 605 of the May BULLETIN. You make me say that the German exhibit at the Philadelphia Centennial was reported to be "cheap and nasty." I believe that my copy stated it to be "very poor." I trust that you will correct this in the next issue of the BULLETIN.

Yours truly,

F. W. SPRINGER.

EDITOR, S. P. E. E. BULLETIN,

Dear Sir: I enclose a short paper to be substituted for the discussion of mine in the Proceedings of Vol. 19, p. 293. Through some accident the proof never reached me and the report as published is absurd and in many parts false. I hope you can publish the revised article for the credit of the Society and myself.

Sincerely yours,

M. E. WADSWORTH.

EDITOR'S NOTE: Dean Wadsworth's article appears on p. 23 of this issue.

EDITOR, S. P. E. E. BULLETIN,

Dear Sir: I have but recently heard of the Society of which you are the Secretary and upon learning of it I decided to take the liberty of writing to you requesting information.

I am a young chap twenty-one years old who hopes in time to secure his C.E. I have had only a common school education but since last November, when I secured a position in a surveying party, I have studied surveying and trigonometry nights.

I have written to the University of Cincinnati and hope some

time to take their course, but at the present I am unable to pass the entrance examinations.

Up to the present I have been struggling along almost in the dark and if you would be so kind a little advice regarding the best course for a fellow in my situation would be greatly appreciated.

Respectfully yours,

_____ _____.

EDITOR'S NOTE: The Secretary referred the above letter to Professor C. E. Sherman and he replied to the young man as follows:

Dear Sir: Professor H. H. Norris has referred your letter of June 18 to me for suggestion and in reply I would say that if you have the means or can borrow the money, it might be well to fit yourself for college at some preparatory school. If you have no money and are obliged to work your own way, you might take the Scranton Correspondence School course at the same time that you are working at engineering work.

Most of a professional man's success depends upon himself rather than any college he may attend and if you are an earnest student, conscientious, careful and thorough in whatever you study, in 10 years' time your efficiency would be such that no one would know that you were not a college graduate. There are some who have trained themselves with such assistance as correspondence schools offer, while working at their professions in a subordinate capacity, who finally make better engineers of themselves than some who are graduates.

Professor Norris will send your letter elsewhere and you will doubtless get advice from other professors from which you can better make up your mind. There are a good many successful engineers who never went to an engineering college.

With best wishes for your success,

Very truly yours,

C. E. SHERMAN.

LETTERS TO THE EDITOR.

EDITOR, S. P. E. E. BULLETIN,

Dear Sir: The writer takes the privilege of addressing you in regard to Efficiency and Scientific Management. Having spent a number of years in factory work, there is and has been a desire for more light on efficiency in the machine work. Can a full knowledge be gained by taking course in some school? The new publication as mentioned in the *American Machinist* of June 12 seems to be instructive. I have a desire for it but write you for more information on the same.

Thanking you in advance for any information you may give, I am

Yours respectfully,

_____ _____.

EDITOR'S NOTE: Members of the Society are requested to send suggestions along the line of the above letters.

EDITOR, S. P. E. E. BULLETIN,

Dear Sir: Few institutions have realized the value of motion pictures for the advancement of engineering education. It is true that most of our state institutions labor under the difficulty of using funds for only the most urgent necessities and any outlay for motion-picture machines and films would usually be out of question.

At the Oklahoma A. and M. College, interest has been held in the Engineering Society on account of the fact that an effort was made to have a film of engineering interest shown at each meeting.

The extension department at the college here is in possession of two motion-picture machines. The Society is usually able to make use of one of these for their meetings every second Wednesday. The films are borrowed from engineering and manufacturing companies, who are willing to grant us their use on account of the advertising of their product. The expense of this entertainment therefore amounts to the expressage, which is a very small item.

Perhaps some of the schools have been using films in this

way and an interchange of firms' addresses having available films would be advantageous to all concerned.

I would invite correspondence on this matter.

Very truly yours,

CHARLES JABLOW.

EDITOR, S. P. E. E. BULLETIN.

Dear Sir: I have been watching the copies of the BULLETIN very carefully to see if anything further has come up in connection with the improvement of physics teaching. I shall be very sorry indeed if the interest of the Society falls off in this matter. I am writing to ask if there is anything that I can do to contribute to a greater interest in this subject. I enclose a circular prepared some time ago by the Joint Committee on Physics giving pictures of apparatus design to teaching fundamental principles.

I shall be pleased to send copies of this to any members of the Society who wish them.

Yours truly,

J. A. RANDALL.

PUBLICATIONS RECEIVED

Bibliography of Smoke and Smoke Prevention, compiled by E. H. McClelland, Technology Librarian, Carnegie Library of Pittsburgh. This Bulletin is the second on Smoke Investigation prepared under the auspices of the Mellon Institute of Industrial Research and School of Specific Industries. It contains 164 pages of references, each giving enough detail so that an investigator using it as a guide can determine whether or not a given article refers to his work. Nearly all of the sources can be found in the Carnegie Library. The Bulletin is published by the University of Pittsburgh at 50 cents per copy.

Bulletins of the University of Illinois Experiment Stations.

No. 65. The Steam Consumption of Locomotive Engines from the Indicator Diagrams, by J. P. Clayton, price 40 cents. This is a 77-p. report of studies of thirteen locomotives. The data are digested and put into tabular form. Typical indicator cards are studied and discussed. Particular attention is given to the application of the logarithmic method for the determination of leakage, clearance, etc.

No. 66. The Properties of Saturated and Superheated Ammonia

Vapor, by G. A. Goodenough and W. E. Mosher, price 50 cents. In this 94-p. pamphlet are given a historical review of the subject, tables of properties of ammonia and vapor under various conditions and of liquid ammonia, and discussion of the Mollier diagram and other fundamental matters. Accompanying the pamphlet is a large heat content-entropy or Mollier diagram for saturated and superheated ammonia for use in solution of refrigeration problems. This is to a large scale.

No. 67. Reinforced Concrete Wall Footings and Column Footings, by A. N. Talbot, price 50 cents. This is a very complete 114-p. report based on experimental work done on a very large number of footings and covering a period of five years. Numerous illustrations showing the appearance of footings after failure are given. Results of the tests are tabulated and reduced to graphical form.

University Business Administration, by J. C. Christensen, Financial Secretary of the Kansas State Agricultural College. The College has published a paper delivered last year before a conference of business officers of the state universities and colleges of the middle West. Accompanying the report are organization charts of the Kansas State Agricultural College.

The Iowa Engineer for April, contained an excellent article on Public Utilities Valuation by G. W. Hand, Valuation Engineer, Chicago & Northwestern Railway Co. This magazine is published by the students of the Iowa State College.

United States Experiment Stations Bulletin 253 contains organization lists of the Agricultural Colleges and Experiment Stations in the U. S. Copies can be secured from the Supt. of Documents, Government Printing Office, Washington, at 10 cents per copy.

Tufts College Bulletin No. 8 contains diagrams of the dormitories with price lists of the rooms.

Safety Valve Rating, by A. B. Carhart, Press of Geo. H. Ellis Co., Boston, Mass. This is a 105-p. pamphlet giving theory and data of safety-valve operation and proposing certain modifications of the inspection rules. The preface states that the book is circulated through the courtesy of the Crosby Steam Gage & Valve Co., of Boston, although it contains no advertising.

Pratt Institute Library Circular, a small circular on what to read on efficiency, contains the titles and names of a selected number of references including Part I of Vol. 20 of the Society Proceedings.

Special Libraries, Efficiency number. The Special Libraries Association, 93 Broad St., Boston, Mass., has published a special number of SPECIAL LIBRARIES giving a selected list of references on scientific management and efficiency. Several hundred such references, with digests of the contents of articles, are given.

PUBLICATIONS RECEIVED.

Proceedings of the Engineering Society of York, Pa., Vol. II, a 90-p. pamphlet, contains technical papers read before the Society during the past few months.

Demonstration and Experimental Equipment for Schools, Siemens & Halske A. G. and Siemens-Schuckertwerke G. m. b. H. (represented in this country by Dr. K. G. Frank, Hudson Terminal Bldg., New York, N. Y.), is a handsomely illustrated booklet of 32 pp. College switchboard and other electrical equipment is illustrated and briefly described. The pamphlet is in English.

A City-planning Classification, by J. G. Pray and Theodora Kimball, is published by the Harvard University Press at 10 cents. It is a preliminary outline of the subject, "printed as manuscript." Advance orders for the complete scheme, to be published at 50 cents per copy, will be received by the publisher.

Columbus Trade School, 1913–14 Course of Study. The youth of this school renders its work of particular interest. This circular states clearly its scope and methods.

Radioactivity, is the title of a pamphlet containing the recent lectures on this subject, by Professor E. P. Adams, of Princeton University, delivered in New York, under the auspices of the American Institute of Electrical Engineers. The pamphlet is published by the Institute, (33 West 39th St., New York), at 50c. per copy.

BOOK REVIEW.

AN ELEMENTARY TREATISE ON CALCULUS. By W. S. Franklin, Barry MacNutt and R. L. Charles. Lehigh University Supply Bureau, South Bethlehem, Pa. Cloth, 6 by 8¼ ins. 316 pp. 122 figures in the text. $2.00.

All members of the Society must have enjoyed Professor Franklin's breezy contributions to the discussion on the teaching of mathematics. They will, therefore, be interested in the new text-book. As was to be expected the authors lay great stress on the physical applications, and the chief value of the book lies in the numerous concrete physical examples and explanations that are given of differentiation, integration and differential equations. In spite of the pruning by the junior authors, traces of the senior author's humor are still apparent and will amply repay perusal. The authors' plea of plausibility and incompleteness in the mathematical definitions and proofs disarms criticism. Let it suffice to say therefore, that

several of the purely mathematical portions of the book could be made more rigorous without adding much to their complexity. It may be doubtful whether the book could be profitably adopted in its present form as a text-book in institutions where the teaching of mathematics is conducted by a separate department. There is no doubt of the value of the book in giving to mathematicians the point of view of a trio of enthusiastic and capable teachers of physics.—F. R. Sharpe.

COLLEGE NEWS.

Acadia University.—Professor P. W. Durkee, who has been professor of engineering, has, on account of ill health, taken a position with the Calgary Power Co., Ltd., Kananaskia, Alberta. His health is much improved.

Columbia University.—Professor A. H. Blanchard represented Columbia University, The American Society of Civil Engineers, The National Highways Association and the American Road Builders' Association at the Third International Road Congress held in London in June. After the adjournment of the Congress he made an investigation of various pavements and roads in England, France and Germany.

Cornell University.—The College of Agriculture was especially fortunate this year in the matter of appropriations, $450,000 for buildings and increases in salaries and $125,000 for current expenses being received. The Veterinary College also received $75,000. The summer school of the College of Agriculture has adopted the plan of paying professors at the same rate for summer as for winter instruction, although they are not encouraged to teach during the entire year.—Professor V. Karapetoff, accompanied by Mrs. Karapetoff, is making a western trip, visiting various electrical developments. He will attend the A. I. E. E. meeting at Vancouver, B. C. early in September returning in time for the fall opening.

University of Glasgow.—The professor of naval architecture, Professor J. H. Biles, has been knighted by King George.

Johns Hopkins University.—The new engineering faculty begins work this fall. Instruction will be given in the old buildings during the current year, the headquarters of the engineering department being in the physics laboratory. The heads of the engineering departments are C. C. Thomas, professor of mechanical engineering, C. J. Tilden, professor of civil engineering and J. B. Whitehead, professor of electrical engineering. It is expected that the new building will be ready for occupancy in the fall of 1914.

University of Maine.—Professor C. Frank Allen recently delivered two lectures before the engineering students, a technical lecture on "Signals" and a non-technical one on "Why Not Study Men?" The appreciation of these lectures was shown by a large attendance.

University of Minnesota.—Dean F. C. Shenehon has spent a part of the summer as engineering counsel for the government in the Chicago Drainage Canal case with which he has been connected for several years.—Professors Cutler and Zelner report a very successful summer surveying camp for juniors.—Professor A. E. Haynes is enjoying comparatively good health and maintains an active interest in the work of the University.

University of Nebraska.—Mr. R. W. Goodard has been acting as instructor in electrical engineering for the past few months.—Toward the close of last term the annual inspection trip was taken and a number of public service and manufacturing plants were visited. Among the most interesting were the wireless telegraph plant and the electrolytic hydrogen-producing plant at Fort Omaha. A small guide booklet was distributed to members of the party.

University of North Carolina.—President F. P. Venable is on leave of absence this year studying and travelling abroad, his place being taken by Dean E. K. Graham.—Professor M. H. Stacy is serving as dean of the college of liberal arts in place of Professor Graham.—Robt. L. James, C.E. (Cornell), is an assistant professor of drawing.—Professor P. H. Daggett takes

up his work in charge of the department of electrical engineering this fall.—Dr. J. M. Bell becomes full professor of physical chemistry and Mr. W. L. Jeffries has been appointed instructor in chemistry.

Pennsylvania State College.—Dean John Price Jackson has received a leave of absence to permit him to take up his duties as Commissioner of Labor and Industry of the State of Pennsylvania with headquarters at Harrisburg. This is a new department and Dean Jackson will have the duty of organizing it.—Professor Hugo Diemer, who for many years has taken an active interest in economics and educational phases of engineering, has been granted the degree of Bachelor of Arts, in history, political science, and economics by the Pennsylvania State College.—Governor Tener has approved a state appropriation of $1,240,000 for the College in addition to the income from the Land Grant Fund and Congressional appropriations to Land Grant Colleges.

University of Pennsylvania.—An appropriation of $820,000 has been made by the State Legislature. This will materially assist in the development of the engineering departments.

University of Pittsburgh.—Dean M. E. Wadsworth was retired upon the Carnegie Foundation under the age rule in June. He has been made Professor Emeritus of Mining Geology and Curator of Mineralogical and Petrographical Collections. During the term preceding his retirement, in addition to his executive duties, he gave fourteen hours of instruction per week, an evidence of his excellent physical condition. He taught Physical and Chemical Geology, Earthquakes, Metamorphism or Geochemistry, Principles of Mining (Economic) Geology, Mining Geology of Metalliferous Deposits and the Genesis of Mineral Deposits. Dr. Wadsworth's educational and scientific work has extended over a period of 49 years. He was President of the Michigan College of Mines for 12 years, Dean of the School of Mines of the Pennsylvania State College for 7 years, Dean of the School of Mines of the University of Pittsburgh for 5 years and State Geologist of Michigan for

5 years. He recently became the first honorary member of the Michigan College of Mines Alumni Association. At a largely attended banquet held recently a loving cup was presented by students and alumni of the University of Pittsburgh and many evidences of the affection of his students for him were given. Dean Wadsworth's final report to the Trustees presented last fall in Vol. 8, No. 20, of the publications of the University contains historical data regarding the School of Mines.—Governor Tener has approved a state of appropriation of $400,000 for the University.

Pratt Institute.—The position of Head of the Department of Applied Electricity has been filled by the appointment of Mr. Arthur L. Cook, formerly of Westinghouse, Church, Kerr & Company. Professor Cook was recently elected to membership in the Society.

Throop College of Technology.—The name of this institution has just been changed from "Throop Polytechnic Institute." In explaining this change the authorities state that the words "Polytechnic" and "Institute" are indefinite in character, the former word being appropriated in southern California almost exclusively in high schools, while common educational usage throughout the country assigns to "institutes" a place somewhere between the secondary and collegiate grades. Throop is the college of technology and as such will hereafter be known.

Washington University.—Professor G. W. Lamke and Mr. C. H. Hardy of the electrical engineering department have resigned to take up active engineering practice.

Wentworth Institute.—On Thursday, June 12, the Institute celebrated the one-hundredth anniversary of the birth of the founder, Arioch Wentworth.—Mr. F. G. Willson, formerly instructor of electrical engineering at the University of Illinois, has joined the electrical staff of the Institute.

DOINGS OF OTHER SOCIETIES.

The American Society for Testing Materials held a three-day meeting at Atlantic City, June 24 to 28. The important topics considered were preservative coatings, properties of steel, wrought iron, cement and concrete water proofing, ceramics, road materials, nonferrous metals and testing.

The Efficiency Society has begun the publication of a monthly Journal to take the place of the Bulletin formerly issued. It is a magazine of about 100 pages, six by nine inches in size with a distinctive cover. The first number of the Bulletin appeared in October, 1912, with 8 pages, subsequent issues varying in size up to 20 pages. The September meeting of the society is scheduled for September 19 at Lake Placid, New York. A three-day conference on non-profit-sharing establishments will be the feature of the meeting. A schedule of meetings for the entire year is contained in the June Journal.

The American Society of Mechanical Engineers held a most successful tour during June and July. The Verein deutscher Ingenieure prepared a 191-p. illustrated guide book in English and German. This contained not only information regarding the places visited, but also served to familiarize the members of the Society with the work of the Verein.

The American Society of Agricultural Engineers has published an index to the first six volumes of proceedings. In a recent letter from Professor I. W. Dickerson, Secretary, he suggests a possible coöperation in certain parts of the work of the two societies.

The National Committee on Standards of Colleges and Secondary Schools recently defined certain terms upon which agreement among secondary schools and colleges is essential. The resolutions which were passed are given below.

Resolved, That the term "honorable dismissal" should be used to refer to conduct and character only, and that honorable dismissal should never be given unless the student's standing as to conduct and character is such as to entitle him to continuance in the institution granting the dismissal. Furthermore, there should in every instance be given, in the statement of honorable dismissal, full mention of any probation, suspension or other temporary restriction imposed for bad conduct, the period of which restriction is not over when the papers of dismissal are issued.

That the term "statement of record" should be used to refer to the recorded results of a student's work in the classroom, and that this statement should in every instance contain all the important facts pertaining to the student's admission, classification and scholarship. In particular, no partial or incomplete classroom record (for example, with failures omitted) should ever be given without clear evidence that it is partial or incomplete; if the student's scholarship has been such as to prevent his continuance in the institution issuing the statement of record or to render him subject to any probation, suspension or other temporary restriction, the period of which is not closed at the date of the record, a plain statement of any and all such facts should be included; and such information should be given as will make clear the system of grades employed, the number of exercises per week devoted to each course, etc.

A unit represents a year's study in any subject in a secondary school, constituting approximately a quarter of a full year's work.

This statement is designed to afford a standard of measurement for the work done in secondary schools. It takes the four-year high-school course as a basis, and assumes that the length of the school year is from thirty-six to forty weeks, that a period is from forty to sixty minutes in length, and that the study is pursued for four or five periods a week; but, under ordinary circumstances, a satisfactory year's work in any subject can not be accomplished in less than one hundred and twenty sixty-minute hours or their equivalent. Schools organized on any other than a four-year basis can, nevertheless, estimate their work in terms of this unit.

A four-year secondary school curriculum should be regarded as representing not more than sixteen units of work.

PRACTICAL WORK IN MINES OR COOPERATIVE PRACTICE.

BY M. E. WADSWORTH,

Professor Emeritus of Mining Geology, University of Pittsburgh.

In the Michigan College of Mines there were at first introduced field and shop work in surveying, geology, mining, mechanical engineering, milling, assaying, metallurgy, etc., similar to that used to a greater or less extent previously in Columbia School of Mines and in other mining schools. While this work was kept up, yet owing in some respects to its not producing all the actual conditions met by graduates in their subsequent employment it was attempted in the early nineties to substitute practical work in the mines under the direction of the mine authorities for the previous practical work done in the mines under the direction of the instructor. This was the exact equivalent of the present so-called coöperative system. The attempted coöperative plan did not succeed, for at that time there were no mines in that district enlightened enough to take the students under their charge as desired. At that time there was not a single mining engineer regularly employed in any of the copper mines in Michigan, except at the Calumet and Hecla which had several, although the chief engineer was a West Point graduate and ex-army officer. All the work in the other copper mines was done as piece work by a firm of engineers or by others. Subsequently as the result of the work of the College, every mining company had on its staff one or more mining engineers.

After resigning the presidency of the Michigan College of Mines in 1899 I introduced later in 1907 in the School of Mines of the Pennsylvania State College a system of practical or coöperative work as follows: "In order to enable the student to become better fitted for his future practice he is allowed to substitute each year for his elective semester work, sixteen periods or ten weeks' work of a specified kind during his

summer vacation, if he desires to do so. In order to substitute, the student first must arrange with the Dean of this school and with the instructor who has charge of the subject, the details of the work, the company and location. When the work has been completed, the student is further to present from the company for which he has worked a certificate stating the kind, character and grade of work done and the time spent thereon. The student must also present a written thesis giving in detail an account of the work he has done and then pass a written or oral examination upon the work and the principles involved.''*

In 1908 the same system was introduced by myself in the School of Mines of the University of Pittsburgh with the modification that the student could use from 4 to 12 weeks of his summer vacation and obtain from 6 to 18 credits for it, as an elective.

In 1910 when the year of four terms was adopted the student was then allowed under the same system to receive 18 credits for each completed 13 weeks of practical or coöperative work, or 72 credits for one year of 52 weeks. He could receive his credits for only one year, but could take all these in that year or at selected times during his course.

It is believed that the above is one of the simplest and best methods yet adopted for giving a student needing it as thorough a training in practical or coöperative work as it is possible to give in the usual course.

* Fasciculus of the School of Mines and Metallurgy, p. 22.

MINUTES OF THE TWENTY-FIRST ANNUAL MEETING.

MINNEAPOLIS, MINN.

JUNE 24 TO JUNE 26, 1913.

The twenty-first annual meeting of the Society for the Promotion of Engineering Education was held in Minneapolis, Minn., June 24 to 26, 1913. The sessions were held in the new Engineering Building of the University of Minnesota. Registration headquarters were at the Hotel Leamington. The program included a joint session with the American Water Works Association at the West Hotel.

TUESDAY, JUNE 24.

Morning Session.

The meeting was called to order by President Wm. T. Magruder, Professor of Mechanical Engineering, The Ohio State University, at 9:45 a. m. Dean F. C. Shenehon was introduced and delivered on behalf of the University and of President Geo. E. Vincent a brief address of welcome including the reading of a letter from President Vincent. President Magruder responded expressing gratitude on the Society's behalf for the cordial welcome extended to the visiting members.

The Secretary, Professor H. H. Norris, and the Treasurer, Mr. Wm. O. Wiley, presented their reports which were on motion accepted. Mr. Wiley had distributed mimeographed

copies of the essential parts of his report and explained verbally that the finances of the Society are in satisfactory condition, even better, in fact, than a year ago. At his request, on motion, the Society instructed the President to appoint an auditing committee to examine the accounts and report at a later session of the meeting. The President appointed Professors G. R. Chatburn, F. A. Fish and O. A. Leutwiler.

After calling for reports from standing committees, none of which were prepared to report, the President requested Dean Bishop to present the report of the Committee on College Administration which had been printed in preliminary form in the June BULLETIN. After Dean Bishop's introduction of the report, he and the Secretary were appointed, on motion, a special convention committee to recommend changes in the By-laws to provide for institutional membership which had been separately recommended in the report and by the Secretary. The topics treated in the report were then fully discussed. The feature which aroused the greatest interest was the real or apparent falling off in the registration in engineering schools and the reasons therefor.

In the absence of Director H. S. Person, of the Amos Tuck School, of Dartmouth College, his paper on "Academic Efficiency" was read in full by the Secretary. Professor A. E. Haynes followed with a short paper entitled "A Source of Academic Inefficiency." In the discussion which this opened, the famous definition of a university as "a log with Mark Hopkins on one end and a boy on the other" became the focus of a lively controversy. Among the speakers was President A. Ross Hill of the University of Missouri.

After the discussion 95 persons were elected to membership in the Society on recommendation of the Council.

Afternoon Session.

The session was called to order at 2:00 p. m. by President Magruder who introduced Professor C. Russ Richards, who read his paper on "Ideals of College Laboratory Construction," illustrating it by means of the lantern. In Professor

Schmidt's absence Professor Richards also read the illustrated paper entitled "Additions to the Equipment of the Railway Engineering Department of the University of Illinois" which had been printed in the June BULLETIN. The two papers were discussed together and Dean W. F. M. Goss, under whose direction the recent building work at the University of Illinois has been carried out, was subjected to quite a cross-examination as to details of the reasons for certain things. Principal A. L. Williston of the Wentworth Institute read his paper "New Buildings for Wentworth Institute: Arrangement of Laboratories and Equipment" with lantern illustrations. The paper opened up the general subject of industrial education and stimulated a lively discussion. The promised paper by Mr. John R. Freeman on "Studies of Requirements in Engineering College Buildings" was read by title and ordered printed in the *Proceedings* when completed.

In a brief business session following the above discussion the Auditing Committee reported as follows:

"We, your Auditing Committee, have examined the vouchers and the report of the Treasurer, Mr. W. O Wiley, and find them in agreement and correct as to expenditures."

(Signed) O. A. LEUTWILER.
F. A. FISH,
G. R. CHATBURN,

The report was adopted without discussion.

Evening Session.

The evening session was a joint one with the American Water Works Association at West Hotel. An illustrated lecture on "Masonry Dams" by Mr. Edw. Wegman preceded a discussion on Hydraulic Engineering Education. President Dow R. Gwinn, of Terre Haute, Ind., President of the American Water Works Association, presided. Two papers formed the basis for discussion, one entitled "Hydraulic Engineering Education," by Professor D. W. Mead, the other on "Undergraduate Training for Hydraulic Engineers," by Professor O. L. Waller. Discussion which followed showed the interest

of practical engineers in the fundamental principles of engineering education. The discussion was contributed by Mr. J. W. Ledoux, Chief Engineer of the American Pipe and Construction Co., Mr. John C. Trautwine, Jr., Professors R. L. Sackett and W. T. Magruder, and Mr. John W. Alvord, Past-President of the American Water Works Association.

WEDNESDAY, JUNE 25.

Morning Session.

President Magruder called the session to order at 9:30 a. m. and stated that no report from the Joint Committee on Engineering Education would be presented as its investigation had been referred to the Carnegie Foundation for the Advancement of Teaching.

President A. C. Humphreys's paper on "Four vs. Five or More Years of Engineering Education," was read by Dean W. G. Raymond who, by permission of the chair, interspersed his own comments with the reading. Professor Swain's paper on the same subject which, with President Humphreys', had appeared in the May BULLETIN was read by title. Professor F. H. Constant contributed a paper entitled "The Five-Year Course of the University of Minnesota," which was illustrated with several charts. The general topic of the morning was then fully discussed, Professor Constant being called upon for the closure.

Professor A. L. Hyde next read his paper on "The System of Grading Students Used at the University of Missouri." At the suggestion of Dean C. M. Woodward, who took the chair for the balance of the session, the remaining paper that morning was presented by the Secretary in the absence of the author, Mr. D. M. Wright. This was entitled "The Revision and Standardization of English Technical Terms." As the paper had been printed in the June BULLETIN, a summary was given with some explanation of the reason for the paper. Mr. Wright's resolution recommending the appointment by the

Society of a committee to consider and promulgate the use of technical nomenclature was read and recommended by the chairman for discussion. The papers of Professor Hyde and Mr. Wright were then fully discussed. President Magruder returned to the chair to put the following resolution, which had been prepared in the meantime by Professor J. J. Flather. "Inasmuch as there is a decided need for the promotion and use of a preferred nomenclature, therefore be it resolved that the Society for the Promotion of Engineering Education appoint a committee to report to the Society any recommendations that they may deem proper to effect an improvement in technical nomenclature." This resolution was adopted without discussion.

Afternoon Session.

The afternoon session was divided into two sections meeting simultaneously at 2:00 p.m. in different rooms of the Engineering Building.

The program for Section 1, presented under the chairmanship of President Magruder, comprised three papers. One of these, a "Symposium on the Coöperative System of Education from the Employer's Point of View," by Dean Herman Schneider, was read by title at Dean Schneider's request. A paper, "Engineering College Shop Practice," by Professor J. V. Martenis and Mr. W. H. Richards, was read and illustrated with elaborate exhibits of shop products. Professor Martenis read the text of the paper and Mr. Richards demonstrated the equipment. This paper elicited a very lively discussion, the authors being subjected to a quiz for a considerable time. Professor T. E. French presented his paper on "The Educational Side of Engineering Drawing," which also brought out an interesting discussion.

The program of Section 2 was made up of the following papers on Highway Engineering Education which had been solicited by Professor A. H. Blanchard. On account of Professor Blanchard's absence due to his attending the International Road Congress in London, Dean F. E. Turneaure presided. The following papers were read mostly by members

of the Society in the absence of the authors: "Highway Engineering, An Essential of Civil Engineering Curricula," by Professor A. H. Blanchard; "Prospective Opportunities for Highway Engineers in a National Highway Department," by Mr. Charles Henry Davis; "Opportunities for Highway Engineers in State Departments," by Mr. A. N. Johnson; "Opportunities for Highway Engineers in Municipal Departments," by Mr. Geo. W. Tillson; "Opportunities for Highway Engineers in Contractors' Organizations," by Mr. H. B. Pullar; "Opportunities for Highway Engineers in Manufacturing Companies," by Mr. Wm. H. Kershaw; "Opportunities of Highway Engineers in the Southern States," by Professor R. J. Potts; "Essential Qualifications of Highway Engineers," by Mr. Harold Parker; "Short Winter Courses in Highway Engineering," by Professor C. E. Sherman; "The Human Element in the Education of Highway Engineers," by Dr. E. Stagg Whitin; "Essentials of Earth and Gravel Road Construction in Highway Engineering Courses," by Professor I. O. Baker; "Soils, An Essential of Courses in Geology for Civil Engineers," by Mr. Geo. W. Cooley; "Financial Problems in Highway Engineering, An Essential Part of Courses in Economics," by Professor G. R. Chatburn; "Highway Materials Laboratory Work in the Civil Engineering Course," by Professor F. H. Eno; "Chemistry of Bituminous Materials in the Civil Engineering Course," by Mr. Prevost Hubbard, and "Highway Surveys in the Civil Engineering Course," by Mr. Henry B. Drowne.

The papers were discussed as a whole and emphasis was laid upon the fundamental principles of highway engineering education. The general sentiment tended to show that the fundamental principles of this subject should be taught to all civil engineers and that the tendency to teach highly-specialized courses, due to momentary pressure from the field, should be resisted.

Evening Session.

The annual address of the President, entitled "The Good Engineering Teacher, His Personality and Training," was

delivered immediately after the annual dinner which was held at the Leamington Hotel. On account of the high temperature and humidity of the atmosphere, the address was not discussed.

THURSDAY, JUNE 26.

Morning Session.

In opening the convention at 9:30 a. m., President Magruder introduced Mr. Ivy L. Lee, executive assistant, The Pennsylvania R. R. Co., who read his paper entitled "How Can the College and the Industries Coöperate?" The promised paper by Mr. E. D. Sabine, first assistant engineer of the New York Central R. R. Co., was not in hand and was read by title. Mr. Lee's paper struck a responsive chord in the minds of the members present and the subject of the qualifications of a technical graduate was vigorously discussed.

Two papers, "The Units of Force," by Professor E. V. Huntington, and "Uniformity of Notation in Strength of Materials," by Professor I. P. Church, were presented, the first by Professor E. R. Hedrick and the second by Professor J. J. Flather. The latter explained that Professor Church preferred to have his paper considered a contribution to the discussion of the other. The general subject of teaching mechanics, especially dynamics, proved intensely interesting to the membership and resulted in a resolution by Professor J. E. Boyd that a special Committee on the Teaching of Mechanics to Engineering Students be appointed and that the subject of teaching dynamics be referred to it. This resolution was adopted and President Magruder announced the following appointments: Professor E. R. Maurer, Chairman, Professors L. M. Hoskins, S. M. Woodward, L. A. Martin, Jr., C. E. Fuller and H. F. Moore, Mr. A. Kingsbury, Dr. Wm. Kent and Dr. S. A. Moss.

On motion, Professor I. P. Church's paper with its recommendations was referred to the new committee.

The President announced (1) the appointment of Dean G. C. Anthony and Professor A. N. Talbot on the Joint Committee on Engineering Education to take the places of President A. C. Humphreys and Professor Samuel Sheldon who had been appointed to represent other societies on this committee; (2) the appointment of the following Committee on Statistics: Professor A. J. Wood, Chairman, Professors F. A. Barnes, F. A. Fish, H. H. Stoek and J. D. Phillips; (3) The recommendation of the Council that a Committee on Teaching Physics to Engineering Students be appointed and that he accordingly had selected the following: Professor D. C. Miller, Chairman, Professors G. V. Wendell, J. M. Jameson, W. S. Franklin, H. M. Raymond, O. M. Stewart, E. P. Hyde, G. A. Goodenough and F. K. Richtmyer.

He also stated that the Committee on College Administration had been continued for another year by the action of the Council.

The Committee on Resolutions then reported as follows:

"The visit of the Society for the Promotion of Engineering Education to Minneapolis has been made pleasant to its members by the many courtesies extended, and your committee desires to record its appreciation.

Therefore, be it Resolved: That the thanks of the Society be hereby tendered to President Vincent, Dean Shenehon, and the other members of the Faculty of the University of Minnesota, and to the local committee for providing places of meeting, and for the various entertainments offered, to the citizens of Minneapolis who furnished automobiles for the delightful ride about the city and who have otherwise assisted in our entertainment, and to the ladies who have acted as hostesses to the ladies accompanying our members.

Further be it Resolved: That the thanks of the Society be tendered to the President and members of the University Club and to the President and members of the Lafayette Country Club for the privileges extended to our members, to

the Walker Art Gallery and to the Washburn-Crosby Co., which has thrown open its works to us.

(Signed) W. O. WILEY,
M. S. KETCHUM,
F. L. BISHOP."

On motion of Professor A. E. Haynes, a vote of thanks was tendered the Secretary for his work on behalf of the Society.

The Nominating Committee recommended the following persons as officers for the next year. On motion they were duly elected by the Society.

For President, G. C. Anthony, of Tufts College.

For Vice-President, H. S. Jacoby, of Cornell University.

For Vice-President, D. C. Humphreys, of Washington and Lee University.

For Members of the Council: H. W. Tyler, of the Massachusetts Institute of Technology; J. F. Hayford, of Northwestern University; A. S. Langsdorf, of Washington University; S. M. Woodward, of State University of Iowa; M. S. Ketchum, of University of Colorado; F. P. Spalding, of University of Missouri; P. F. Walker, of University of Kansas.

For Secretary, H. H. Norris, of Ithaca, N. Y.

For Treasurer, W. O. Wiley, of New York City.

The above committee comprised the following: H. T. Eddy, Chairman, C. M. Woodward, W. G. Raymond, F. E. Turneaure C. H. Crouch, C. L. Crandall and J. E. Boyd. J. E. Boyd acted as Secretary.

The Society approved the action of the Council providing for such a change in the By-laws as will prescribe a committee on sociability to consist of the officers of the Society and the local committee at each meeting.

President Magruder announced the following appointments on the Committee on the Standardization of Technical Nomenclature: Professor J. J. Flather, Chairman, Mr. D. M. Wright, Professors W. D. Ennis, S. C. Earle and F. N. Raymond.

Afternoon Session.

At the 2:00 o'clock session, over which President Magruder presided, reports were read from the four committees on improvement in engineering instruction. These reports had been prepared under the direction of the respective chairmen as follows: Civil Engineering, Professor F. P. McKibben; Electrical Engineering, Professor C. F. Scott; Mechanical Engineering, Professor A. M. Greene, Jr.; and Mining Engineering, Professor F. W. Sperr.

On motion by the Society, these four committees were continued for another year with the request that they carry out their own programs and publish in the BULLETIN at once something tangible in the way of suggestions.

Professor H. Wade Hibbard then read his paper on "Thesis Directions for Students" as an appendix to which a list of some 1,500 thesis topics was presented but not read. The subject of thesis work aroused considerable discussion and in the main Professor Hibbard's contention for the place of the thesis in the curriculum was supported.

Professor Magruder read the paper by Professors C. E. Sherman and R. K. Schlafly entitled "Summer Surveying Courses at The Ohio State University," which had been printed in extended abstract in the June BULLETIN. The balance of the session was spent in the discussion of this paper, after which the convention adjourned for a trip on Lake Minnetonka and a closing dinner at the Lafayette Country Club.

ATTENDANCE AT THE CONVENTION.

One hundred and seventeen members and guests registered at the convention, a very satisfactory number in view of the conflicts with other Society meetings and the fact that the meeting was held farther west than any preceding one.

The names registered are as follows: L. K. Adkins, Ethan Allen, Emil Anderson, M. N. Baker, A. T. Baldwin, Frederic Bass, J. T. Bates, S. W. Beyer, F. L. Bishop, James E. Boyd, B. B. Brackett, W. E. Brooke, S. S. Bruce, F. E. Burpee, E.

F. Chandler, G. R. Chatburn, H. E. Cobb, E. F. Coddington, E. H. Comstock, F. H. Constant, Robertson Cook, C. L. Crandall, Mrs. Crandall, C. H. Crouch, A. S. Cutler, H. H. Dalaker, R. L. Daniel, Fred Dedolph, H. M. Dibert, J. W. Dietz, H. T. Eddy, H. S. Evans, M. I. Evinger, J. H. Felgar, F. A. Fish, J. J. Flather, A. H. Ford, H. C. Ford, M. M. Foss, E. H. Freeman, T. E. French, A. J. Frith, W. F. M. Goss, S. C. Hadden, A. E. Haynes, E. R. Hedrick, H. Wade Hibbard, F. G. Higbee, A. Ross Hill, W. C. Hoad, J. A. Hunter, A. L. Hyde, A. C. Jewett, W. H. Kavanaugh, E. W. Kellogg, Milo S. Ketchum, R. S. King, W. H. Kirchner, Ivy L. Lee, O. A. Leutwiler, E. S. Macgowan, C. E. Magnusson, Mrs. Magnusson, W. T. Magruder, J. V. Martenis, W. H. Martin, C. J. Martinson, E. R. Maurer, D. W. Mead, W. H. Meeker, C. E. Mickey, J. L. Mowry, C. C. Myers, B. L. Newkirk, H. H. Norris, R. W. Otto, Chas. H. Owen, J. I. Parcel, S. M. Pike, Wm. G. Raymond, C. Russ Richards, W. H. Richards, F. B. Rowley, W. B. Russell, W. T. Ryan, Adolph Shane, F. C. Shenehon, G. D. Shepardson, C. F. Shoop, P. A. Small, J. E. Smith, H. C. Solberg, F. P. Spalding, F. W. Sperr, F. W. Springer, G. W. Sublette, L. B. Taylor, C. C. Thomas, Mrs. Thomas, H. A. Thomas, J. S. Thompson, M. E. Todd, F. E. Turneaure, P. F. Walker, O. L. Waller, Chauncey Wernecke, N. S. Whipple, W. O. Wiley, W. S. Williams, A. L. Williston, Mrs. Williston, F. N. Willson, C. M. Woodward, S. M. Woodward, L. F. Wooster, A. S. Young, Anthony Zeleny (117).

Social Features of the Convention.

The social feature of Tuesday afternoon was an automobile trip. The itinerary included a portion of the business and residence districts of the city and about twenty of the thirty-five miles of boulevard belonging to the Minneapolis parkway system. This boulevard skirts a number of beautiful lakes within the city limits and includes the park within which is located the famous Minnehaha Falls. Twenty-four automobiles had been promised for this trip, but, on account of a heavy shower which came up at about the time the party was

to start, only sixteen were available. All who wished to go were accomodated without difficulty, however, as a number of members had left before the trip was scheduled to begin, supposing that it would be given up. The rain only partly interfered with the comfort of the members and not at all with their pleasure.

On Wednesday afternoon the ladies of the faculty tendered a reception to the members of the Society and their guests. This was attended by about one hundred persons. During the reception interesting moving pictures, representing scenes in the Glacier National Park, were exhibited and added to the pleasure given by the other entertainment.

At the annual dinner held on Wednesday evening in the main ball room of the Hotel Leamington there were eighty-one members and guests present. An informal reception was held by President Magruder in the lobby immediately before the dinner, and after the dinner and the President's address, the diners adjourned to the cool and commodious piazzas where social intercourse was enjoyed until a late hour.

After final adjournment on Thursday afternoon the local committee tendered an excursion to Lake Minnetonka. The trip was made by trolley from Minneapolis to Excelsior, at which point the launch "Victor" was boarded for a short sail on Lake Minnetonka ending at the Lafayette Country Club. Here a dinner was served and the guests returned to Minneapolis about 9:00 p. m. Approximately eighty-five persons participated in the excursion.

During the sessions several parties were escorted through the flour mills and the T. B. Walker art galleries.

Meetings of the Council at Minneapolis.

Meetings of the Council were held on June 24, 25 and 26. Members who attended one or more sessions were: F. L. Bishop, J. E. Boyd, G. R. Chatburn, C. L. Crandall, C. H. Crouch, H. T. Eddy, C. E. Magnusson, W. T. Magruder, H. H. Norris, W. G. Raymond, C. Russ Richards, G. D. Shepardson, W. O. Wiley and C. M. Woodward. The meetings were held

in the faculty room adjoining Dean Shenehon's office. They were all scheduled for three quarters of an hour preceding the morning sessions.

The important motions passed were as follows:

1. That the Council approve the general plan of membership by educational institutions.

2. That the institutional membership fee be $10.00, that each institutional member receive three sets of publications and that each be entitled to one official delegate at annual meetings.

3. That parts of the BULLETIN be reprinted as the *Proceedings* of the Society, and that the Publication Committee be authorized to include, as part of such *Proceedings*, papers other than those presented at the annual meeting.

4. That the Executive Committee be requested to present a budget of estimated receipts and expenditures for the coming year.

5. That each member of the incoming Council be furnished with a copy of this budget.

6. That the Committee on Industrial Education be discharged with thanks and that it cease to be a standing committee.

7. That the Committee on Statistics be continued as a standing committee.

8. That the Society coöperate with the Carnegie Foundation for the Advancement of Teaching in its investigations.

9. That the appointment of Messrs. Anthony and Talbot to represent the Society on the Joint Committee on Engineering Education be approved.

10. That the Committee on the Teaching of Mathematics to Students of Engineering be discharged with thanks and that Professor Huntington personally be thanked for his efforts.

11. That the President's plan for Committees on Teaching Mechanics to Engineering Students and Teaching Physics to Engineering Students be approved.

12. That the appointment of delegates to the next National Conservation Congress be referred to the incoming officers.

13. That the incoming Executive Committee be requested to confer with officers of other societies looking to a permanent arrangement for avoiding conflicts and securing consecutive dates for meetings as nearly as possible.

14. That Princeton be recommended to the incoming Council as a place for the 1914 meeting, the date to be arranged in coöperation with the American Society for Testing Materials.

15. That California be approved for the 1915 meeting and that the incoming Council be recommended to proceed at once with suitable arrangements.

16. That a new department to be entitled "Questions and Kinks" be added to the BULLETIN.

17. That a recommendation be laid before the Society to permit such a change in the By-laws as will provide for a Committee on Sociability to serve especially at the annual meeting, and to consist of the officers of the Society and the members of the local committee.

18. That a group photograph of the convention be published in the BULLETIN with key.

19. That abstracts of all papers must be received by the Society at least two weeks before the annual meetings.

20. That the incoming Committee on Publication provide for the publication of a twenty-year index to the *Proceedings*.

21. That members elected after January 1 be granted a reasonable reduction in dues for the balance of the college year.

22. That the Council recommend that the Society take the steps necessary to render the Secretaryship permanent.

23. That the retiring and incoming presidents and the Treasurer be appointed a committee to consider and report to the Council in 1914 as to whether the Secretary of the Society should necessarily be in the active work of teaching, and second, to find a suitable man who will accept the position of permanent Secretary of the Society beginning in 1914.

24. That the Committees on Coöperation in Civil, Mechanical, Electrical and Mining Engineering Education, respect-

ively, and the Committee on College Administration be continued for another year and requested to bring in full and final reports.

In addition to the above motions the President announced appointments to the Committees on Statistics, on the Teaching of Mechanics to Engineering Students and on the Teaching of Physics to Engineering Students as reported in the minutes of the annual meeting.

The following applicants were recommended to the Society for election: M. W. Acker, S. O. Andros, W. R. Appleby, A. T. Baldwin, H. H. Barnes, Jr., H. G. Benedict, A. G. Bierma, J. R. Bloom, J. N. Bridgman, O. P. Briggs, S. S. Bruce, C. J. Carter, A. L. Cook, Paul Cook, Robertson Cook, S. E. Coombs, Ollison Craig, Ray Crow, C. P. Crowe, L. F. Curtis, H. M. Dadourian, R. E. Davis, H. M. Dibert, C. F. Dreyer, F. C. Dyer, W. W. Edwards, Harrington Emerson, C. E. Ferris, A. B. Fletcher, C. W. Foulk, W. A. Gleason, L. M. Gram, W. F. Gurley, George Hatjidakis, W. A. Hedrick, F. W. Hehre, F. A. Hitchcock, E. B. House, Joseph Hudnut, R. W. Hunt, H. B. Hutchins, E. A. Johnson, C. T. Johnston, E. W. Kellogg, W. H. Kershaw, H. W. King, H. H. Lauer, J. N. LeConte, J. F. Lewis, O. L. Lewis, S. B. Lilly, C. M. McKergow, J. H. MacCracken, J. R. Marker, W. H. Martin, F. E. Mathewson, A. F. Meyer, A. R. Munro, C. A. Nash, W. H. Perry, H. S. Philbrick, Anthony Pinto, H. C. Ramsower, H. U. Ransom, W. H. Rayner, B. K. Read, Irwin Rew, Clifford Richardson, H. E. Riggs, J. E. Robertson, F. A. Robbins, J. W. Rollins, J. A. B. Scherer, R. K. Schlafly, E. L. Shepard, S. L. Simmering, P. R. Smith, C. K. Smoley, J. F. Stevens, J. F. Stone, R. L. Streeter, W. W. Strong, B. N. Swamy, W. C. Taylor, W. E. Taylor, R. C. Terrell, H. A. Thomas, C. J. Tilden, M. E. Todd, Alexander von Ritter, E. C. White J. B. Whitehead, E. S. Whitin, W. S. Williams and F. N. Willson. (95).

The following estimated budget of income and expenses for the coming year was reported by the Executive Committee:

Estimated income.

From current and back dues	$4,800
From advertising in BULLETIN	1,100
From publications of all kinds	600
Total	$6,500

Estimated expenses.

Treasurer's office—salaries	$ 250
Treasurer's office sundries	50
Secretary's salary	1,000
Secretary's clerical assistance	300
Secretary's stenographer	400
Sundry printing	200
Printing BULLETIN*	1,500
Mailing BULLETIN	50
Printing *Proceedings*	1,500
Drawing and engraving	100
Expenses, Minneapolis meeting	250
Postage—general	500
Expressage	75
Telegrams	15
Office sundries	50
Total	$6,240
Estimated excess of receipts over expenses	$ 260

Respectfully submitted,
HENRY H. NORRIS,
Secretary.

SECRETARY'S REPORT FOR 1912–1913.

The past year has been an active one in the line of publications and their distribution.

Last year the Society reprinted the report of the Committee on Teaching Mathematics to Engineering Students, binding it in semi-flexible blue covers. This was advertised by means of circulars sent to mathematicians and to others interested, by insertions in the American Mathematical Society *Bulletin*, by reviews in the technical press and by insertions in our own BULLETIN. As a consequence the first edition of 1,000 was soon disposed of and a second edition of 500, incorporating revisions

**Note.*—The above estimate for printing BULLETIN is based on the cost during the past year and no allowance is made for the credit to be allowed on the *Proceedings* which are to form the main part of the BULLETIN. The Publication Committee hopes to save $500 by eliminating double publication.

by the Committee, is now being sold. The income from these sales covered the cost of publication and enabled the Executive Committee to reimburse the committee which prepared the report for their expenditures. The report has taken its place as a standard of reference and its preparation and publication are highly creditable to the Committee and the Society. The Treasurer's report shows that the sales brought in $699.71 during the year.

The Symposium on Efficiency in College Administration and on the Teaching of Scientific Management was published late in the year and is now being advertised. This is a companion volume to the Mathematics Report and it will undoubtedly take its place as a standard of reference also. The edition of this is but 500 copies.

The expedient of printing the *Proceedings* in two parts was adopted this year in order to get the efficiency papers into the hands of the members early. By this means a portion of the *Proceedings* was distributed several months earlier than usual. The second part would have been in the hands of the members before this except for an unusual congestion in the printing office. On account of the complicated nature of the program of the Boston meeting the publication of the *Proceedings* has presented unusual difficulties this year. The Executive Committee felt justified in incurring the extra expense for binding the *Proceedings* in two parts for the reason given.

An unusual effort has been made this year to circulate the reports of committees of the Society. These reports have been advertised in every possible way and a large number have been sent out. The Publication Committee feels that an important part of the work of the Society is the circulation of its findings on important educational matters. A most serious problem is how to place the reports where they will have their maximum influence.

The membership campaign has been carried on this year under various schemes and with fairly satisfactory results. While there is still a field from which to draw new members there is evidently a "saturation point" of membership which we are gradually approaching.. Unless there is some radical change in the scope of the work of the Society, which at present seems inadvisable, the ultimate membership will probably not exceed 2,000. The normal growth seems now to be about 100 members per annum. The best results are secured through personal invitations from the members to their friends. These have been especially effective during the past six weeks. At the Boston meeting 68 persons were elected to membership, which number was increased by 60 during the year, making a total gross increase of 128 for the year. During the year 42 resignations were accepted, 20 members were dropped for nonpayment of dues and 3 died. The net increase is smaller than it would have been had we followed the usual custom of sending out letter ballots

up to the close of the year. To offset this there will be a larger number elected at this Minneapolis meeting than usual.

The Treasurer's report shows that the finances of the Society are in satisfactory condition. Supplementing his report I would say that the actual expenses incurred during the year are less than the income. There are bills for printing Part II of Vol. 20 of the *Proceedings* and the April, May and June BULLETINS, which have not yet been presented. This result is satisfactory in view of the extraordinary publication expense to which the Society has been subjected this year, the printing bills actually paid amounting to $4,356.77.

The arrearages for dues are not serious at the present time, only one member owing more than $8.00. 67 members owe for dues prior to 1912–13. An inspection of the list shows that in most cases the arrearage is due to oversight.

The life membership fund has not grown during the past year except by the addition of interest. As the life membership fee is small in proportion to the annual dues, no effort has been made to increase the life membership.

An important element of the Society's work is the relation to other associations. An interesting feature in this connection was the joint session held with the American Road Congress at Atlantic City on October 3, 1912. At this session the following papers were presented under the general direction of Professor F. P. McKibben. The meeting was held on Young's pier, Atlantic City, on the afternoon of October 3 with an attendance of about 150 persons, of whom about 15 to 20 were members of the society.

"Highway Engineering Education," Professor Arthur H. Blanchard of Columbia University, New York City.

"Essential Requisites in the Making of a Highway Engineer," Stuart A. Stephenson, Jr., instructor in civil engineering, Rutgers College, New Brunswick, N. J.

"What Should Constitute a Course in Highway Engineering," Professor E. B. McCormick, professor of experimental engineering, Kansas State Agricultural College, Manhattan, Kans.

"Highway Engineering in a General Course in Civil Engineering," Professor Hugh Miller, professor of civil engineering, Clarkson School of Technology, Potsdam, N. Y.

At the Boston meeting a joint session was held with the American Institute of Electrical Engineers, the proceedings of which appear in the transactions of that society. A copy of the report of the A. I. E. E. Committee on Industrial Education, which was presented at this joint session, was sent to each member of the Society last July. At this Minneapolis meeting a joint session with the American Water Works Association will be held. This feature of the Society's work must have careful attention in the future.

RECOMMENDATIONS.

It would seem wise to have a committee to study the relations of this society to other societies with allied interests. It might be well to have on such a committee one representative of each of the societies with which affiliation is desired.

There is an increasing tendency, I believe, for educational instititions to be represented by official delegates. This suggests the importance of a closer union between the Society and institutions of learning. I suggest that there be introduced some form of institutional membership corresponding to the accompanying membership of the National Electric Light Association, the American Electric Railway Association and other societies. Institutional membership would greatly strengthen this society and it would make the Society more useful to the institutions. Fees for institutional membership might be graduated in accordance with the enrollment, *e. g.*, over 5,000, $25.00; 4,000 to 5,000, $20.00; 3,000 to 4,000, $15.00; 1,500 to 3,000, $10.00; under 1,500, $5.00.

We now publish a great deal of material in duplicate in the BULLETIN and *Proceedings*. While there is a slight saving due to composition on standing matter from the BULLETIN used in the *Proceedings*, this actually amounts to very little. I believe that some plan for reducing the printing expense without decreasing the value of the publications can be devised. I, therefore, suggest that the Publication Committee be authorized to make such change in the procedure as will insure the necessary funds for improving the BULLETIN and at the same time make provision for continuing the bound volumes either of the BULLETIN itself or of selected portions of the BULLETIN which can be printed at the same time as the regular issues and afterward bound up in permanent form.

In conclusion I wish to call attention to a fact which may not be fully appreciated by the membership of the Society.. Owing to the fact that the Secretary conducts most of the correspondence of the Society and does all of the advertising his work is most conspicuous. As a matter of fact the President and the Treasurer are constantly at work in the Society's interests. As a member of the Executive, Publication and Program Committees the President is in almost continuous correspondence with other officers and with members and non-members. All proof goes through his hands and it is carefully read. All questions of policy are submitted to him and he must approve all expenditures. Similarly the Treasurer is a member of the Executive and Program Committees and there is a continual stream of correspondence going through his office. The Vice-presidents and the Junior Past-president also come in for a liberal share of work which is always given prompt and careful attention.

Respectfully submitted,

HENRY H. NORRIS,

Secretary.

COUNCIL LETTER BALLOTS TAKEN DURING 1912–13.

August 15, 1912. By letter ballot the Council elected the following members: B. H. Brown, L. H. Harris, Francis Mallory, I. P. Morrison, J. W. Muldowney, T. M. Roberts, L. B. Taylor, H. E. Webb (8). On the same ballot the Council minutes of the Boston meeting were approved.

January 15, 1913. By letter ballot the Council elected the following members: Samuel Applin, E. S. Barney, F. C. Biggin, C. W. Bloemker, R. W. Brink, W. W. Carlson, W. G. Catlin, M. M. Cory, J. S. Crandell, Hardy Cross, H. S. Dickerson, E. B. Durham, R. E. Edgecomb, B. G. Elliott, G. W. H. Fawkes, J. H. Felgar, G. A. Gabriel, W. P. Graham, M. B. Greenough, P. R. Hall, A. E. Hill, F. J. Holder, D. R. Jenkins, S. S. Keller, R. H. Krewson, E. M. Lawley, H. N. Lendall, O. C. Lester, F. C. Loring, W. R. McCann, C. C. May, W. F. Morgan, J. J. Morris, J. L. Mounce, J. F. Murphy, A. B. Newhall, F. A. Randall, F. J. Rankin, A. T. Robinson, R. A. Seaton, G. W. Smith, H. J. Spooner, A. C. Stevens, F. G. Tappan, F. W. Taylor, Alfred Thompson, E. B. Thurston, L. L. Thurstone, J. P. Tivey, L. L. Vaughan, Chauncey Wernecke, J. E. Woodman (52).

June 1, 1913. A letter ballot was taken to permit the following changes in the Constitution to be brought before the Minneapolis meeting.*

Art. 6, line 9. Change "Proceedings" to "Bulletin."

Art. 8, change to read: "Art. 8. *Publications.* The publications of the Society shall include a monthly Bulletin to be published from September to June inclusive. The Bulletin shall contain the proceedings of the Society and such other material as the Publication Committee shall determine." Results: 22, Aye; 7, No.

Respectfully submitted,

HENRY H. NORRIS,

Secretary.

* N. B. At the meeting it was decided not to make the above changes.

APPENDIX.

BULLETIN ADVERTISING BY MONTHS.

Month.	Amount.
September	$ 112.75
October	137.00
November	101.00
December	157.00
January	132.00
February	118.75
March	113.75
April	111.25
May	104.25
June	108.75
Total	$1,196.50

TREASURER'S REPORT 1912–1913.

To the Society for the Promotion of Engineering Education:

The Treasurer would respectfully report the condition of the Society's finances as follows:

COMPARATIVE BALANCE SHEET, 1911–1912 AND 1912–1913.

Assets.

	1913.	1912.	Increase.	Decrease.
Cash	$1,763.26	$2,194.01		$430.75
Non-members—arrearage Members—arrearage	1,558.46	1,092.47	$ 465.99	
Proceedings, Inventory	3,942.75	3,014.00	928.75	
	$7,264.47	$6,300.48	$1,394.74	
			430.75	
			$ 963.99	

Liabilities.

	1913.	1912.	Increase.	Decrease.
Accounts payable*				
Members paid in advance	$ 105.29	$ 63.50	$ 41.79	
Life Membership	310.12	300.00	10.12	
Due non-members	.99		.99	
Surplus	6,848.07	5,936.98	911.09	
			$963.99	

* There are outstanding accounts for which bills have not been presented. As far as the Treasurer's accounts are concerned such become payable only when audited.

Trading Account.

June 1912—Inventory	$3,014.00	
Cost of Proceedings, Bulletins and Reprints, 1912–13 (Schedule F)	4,356.77	
	$7370.77	
Less Inventory of Proceedings, Bulletins, Reprints on hand, June, 1913 (Schedule C)	3,942.75	
Cost of Sales		$3,428.02
Balance, Profit and Loss Account (Profit)		172.79
		$3,600.81
Advertising	$1,229.25	
Less Discount	17.84	$1,211.41
Math. Report		699.71
Bulletin and Proceedings		1,514.84
Reprints and Scientific Management		174.85
		$3,600.81

Profit and Loss Account.

Expenses on Boston Meeting	$ 344.60	
Expenses on Atlantic City Meeting (Schedule H)	5.85	$ 350.45
Secretary's Office Expenses (Schedule I)		1,958.78
Treasurer's Office Expenses (Schedule J)		291.82
		2,601.05
Profits for year		1,079.59
		$3,680.64
By Trading Account		$ 172.79
Dues		3,474.00
Interest on Bank Balances		33.85
		$3,680.64

Balance Sheet.

Assets.

Accounts Receivable: Members, Back Dues (Schedule A)	$ 253.50	
Current Dues (Schedule B)	815.60	
Members and Non-members, for Advertising and Publications (Schedule C)	489.36	$1,558.46
Cash: Lincoln Trust Company	1,453.14	
Union Square Savings Bank (Life Membership Fund)	310.12	1,763.26
Inventory: Proceedings, Bulletin, and Reprints		3,942.75
		$7,264.47

Liabilities.

Members, Dues paid in advance (Schedule B).....	$ 105.29	
Due Non-members (Schedule E)	.99	$ 106.28
Surplus, June 18, 1912	5,936.98	
Less Members' Dues of prior years, dropped this year	168.50	
	5,768.48	
Profits for year (See Profit and Loss Account)....	1,079.59	
	6,848.07	
Life Memberships	310.12	7,158.19
		$7,264.47

MEMBERSHIP.

	No. of Mem.	New.	Res. or Dropped.	Total
June 1911	1071	114	83	1102
June 1912	1102	107	51	1158
June 1913	1158			

It will be noted that the Treasurer's accounts are kept in accordance with the following schedules, which are not printed as they are quite extensive. These schedules are kept filed for reference by members of the Society in the Treasurer's office. (A) Back dues, (B) Current dues, (C) Accounts receivable for advertising and publications from members and non-members, (D) Members paid in advance, (E) Due non-members, (F) Printing (sundry, BULLETIN, *Proceedings* and reprints), drawing and engraving and editor's salary, (G) Inventory of *Proceedings*, BULLETIN and reprints, (H) Expenses of meetings, (I) General expenses such as postage of all kinds, telegrams, advertising of publications, expressage and freight, clerical assistance, insurance, committee expenses, Secretary's salary, etc., (J) Expenses of the Treasurer's office.

As announced in my last report I have deducted from each payment for dues the sum of one dollar for a subscription to the BULLETIN. This is in accordance with the requirements of the Post-office Department. The income from the sale of BULLETIN and *Proceedings* in the Trading Accounts is, therefore, increased and the income from dues appearing in the Profit and Loss Account is decreased by a number of dollars numerically equal to the net membership.

Respectfully submitted,
W. O. WILEY,
Treasurer.

PROCEEDINGS OF THE TWENTY-FIRST ANNUAL MEETING.

ADDRESS OF WELCOME ON BEHALF OF THE UNIVERSITY OF MINNESOTA.

BY FRANCIS C. SHENEHON,

Dean of the College of Engineering.

Mr. President and Members of the Society: It is my very pleasant duty on behalf of the Faculty of the College of Engineering to welcome you to Minnesota. You will realize that the College of Engineering of this university is one of the youthful technical schools of the country. Whatever of transition and unfinished conditions you see, therefore, you will credit to present progress.

I regret that our president, Dr. Geo. E. Vincent, is not here to welcome you for the University. He has put into manuscript certain words of welcome, perhaps not the exact words he would have spoken had he been here. It is my pleasure to read these written words to you.

"To the Members of the Society for the Promotion of Engineering Education, Gentlemen: It is a source of regret to me that I cannot in person welcome you to the University of Minnesota. Your presence here affords pleasure to our academic community. Back of the highly-specialized pursuits of our educational work lies a common interest in scientific processes, in practical applications of truth and in a more efficient social service.

The College of Engineering of this university feels particular satisfaction in your visit. We are building up in this urban center an engineering school in which we take increasig pride. You have an opportunity to observe our engineering equipment. We feel rather complaisant about this, but

we are more concerned with the thoroughness of our instruction and the value of our work to the people of the state.

The service of your association in fixing educational standards is, I am sure, appreciated by institutions everywhere. In the absence of such bureaucratic control as Germany and France provide, voluntary co-operation is the characteristically American method. What it lacks in uniformity and authority it makes up in spontaneity and resourcefulness.

I have not the technical knowledge which would enable me to make contribution to your deliberations. I have only one thought to suggest. The contrast today between vocational and cultural studies may be over-emphasized. You have a problem to include in your curriculum an increasing number of technical and professional pursuits, and at the same time to retain even a slight trace of those studies which used to go by the name of the "humanities." There is a certain wistful pathos in the thought that a little French or German, a smattering of English Literature, a course in Economics or Civil Government, are supposed to represent the "cultural" element in the engineering course.

We are beginning to revise our ideas of culture. We are trying to give the term a new meaning for the modern man. We do this by translating the old cultural attitude into new relationships to life. The engineer has in his calling two obvious sources of cultural appreciation,—the romance of his work, and its bearing upon the welfare of mankind. Kipling has shown us the opportunities of idealizing the mechanisms of today. He appeals to the imagination and stirs the hearts of men. The young engineer may well cultivate in himself this romantic feeling for his work and from this gain a deepening culture. To think of himself as a social servant, to have a vision of what his work means in the life of the world, to know that upon it depends the safety, the comfort, the happiness of millions,—this is to feel the thrill of a common life. To foster these ideals is a part of your task of which I am sure you are not neglectful.

May your deliberations mark new progress in the standards and ideals of your profession. May you strengthen the bonds of comradeship and deepen that sense of corporate co-operation which gives to each man the wisdom and the courage of his fellows. Sincerely yours,

GEO. E. VINCENT."

RESPONSE. ON BEHALF OF THE SOCIETY.

BY WILLIAM T. MAGRUDER,

President of the Society.

Dean Shenehon and other Members of the Faculty: On behalf of the officers and members of the Society, I desire to express to you, to the College of Engineering and to President Vincent of the University, our very sincere thanks for the words of welcome and advice. Some of us have already been feeling at home since coming into your hospitable city. Some of us have been here before. For myself I feel thoroughly at home for the reason that, while I was not born here, my father, an army officer stationed at Fort Snelling, helped to make this place habitable for you and me by engaging in the Indian wars some sixty years ago. Hence tradition in my family makes Minneapolis quite a home city to me. Your words of welcome are very acceptable and will be passed on through me and the other officers to all the members of the Society.

THE GOOD ENGINEERING TEACHER, HIS PERSONALITY AND TRAINING.

PRESIDENTIAL ADDRESS.

BY WILLIAM T. MAGRUDER,

Professor of Mechanical Engineering, The Ohio State University.

At the meeting of Section E on Engineering Education of the World's Engineering Congress which was held in Chicago in 1893 in connection with the World's Columbian Exposition, there were assembled "seventy or more" engineering educators from the United States and eight or more foreign countries. This society owes its existence to the Congress and to the thought and labors of Professor Ira O. Baker, chairman of the Division Committee, and Professor C. Frank Allen, its secretary, pro tem. Of the seventy charter members, twenty-nine have either gone to their reward or have withdrawn from the Society. Only forty-one of the seventy are now members of the society. Eleven of the living past presidents are charter members, three became members in 1894, and one each in 1895, 1897, and 1902. That was twenty years ago. Some of us are no longer boys, even if we do feel as young and as full of enthusiasm as we did then. If time and your patience permitted it, and I were able, it would delight me to recall in great detail the lives and examples of some of the giants in engineering education whose successors we are—of the cultured Thurston, of that dynamic giant, DeVolson Wood, of that inventive genius, Robinson, of the courtly Chanute, of the erudite Johnson, and of the versatile Storm Bull. I offer you my congratulations on being allowed to follow where they have led the way.

But after twenty years of this society's existence for the promotion of engineering education, at this its twenty-first meeting, when our growth betokens that we have come to our legal majority, at least in years, I desire to lead your minds

into the consideration of what is a good engineering teacher and to give you an appreciation of his personality, and what he is as I have seen him in three score and more of engineering colleges and technical schools.

What then is a good teacher? And my first answer is that he is one who knows enough of his subject to have something to impart. I sometimes think the reason men from the highest ranks of consulting engineers so frequently make poor teachers, from the point of view of the students, is that they know too much, and cannot appreciate the fact that the students are down in the basement of the structure whose facade they are embellishing with artistic points of elegance and efficiency, and that the students are crawling on hands and knees along the path they are traveling with seven-league boots. In order that the teacher shall have something to impart, he should have had a proper education and some training, experience, travel, and observation, as these are among the necessary qualifications for a good teacher. The man who has never earned his daily bread in the close commercial competition of the factory, works or mine, needs to learn one of the essential requirements of the successful engineering teacher, namely to have rubbed elbows with workingmen of the artisan type and to have measured himself by their standards of knowledge and skill. One who has received only the education that he is trying to impart, possibly at his alma mater, probably in the same room in which he received it, who has never cut himself loose from his college's apron strings, and who has not taught or worked elsewhere, is not likely to make a good teacher until he has been trained in the school of experience elsewhere. If graduate students should migrate for their best good, surely college teachers should do the same. In a previous paper before this society, I have already referred to one institution, almost one hundred per cent. of whose teachers in one department are the educational offspring of the great mind which presided over the department for thirty years. Experience of any kind always serves a teacher well, and the more he has had of that which

pertains to the subjects that he is teaching, the better it will be for him and his students. Travel and inspection trips, to learn by observation how others are doing the same thing that he is expected to do, are extremely broadening and take him out of his natural groove. It is needless to say that continued reading and increase in one's knowledge of his profession is absolutely essential for the advancement of the good teacher.

A good teacher is one who can talk on his feet audibly enough to be heard without effort and intelligently enough to be understood without subsequent correction. For, if the listener cannot hear what is being said for his instruction, both parties are wasting time which is more or less valuable. If the recipient of the instruction continuously fails to get an intelligent understanding of what has been said, he has no right to be in attendance; and, similarly, if the teacher continuously fails to give an intelligent understanding of what he is trying to say, he should be removed and not allowed to waste the valuable time of the students. A man who cannot impart his knowledge cannot be a good teacher. Hence, health, adequate previous rest, and endurance are essential to the good teacher. Few of us, I think, appreciate the difference in the instruction given and taken in September and in May, on Monday and on Friday, after a holiday spent in restful occupation and amusements and after an entertainment lasting until far past midnight. Some of us occasionally fail to consider and measure accurately the cash value of an hour of a class's time. We should be greatly disturbed if in our factory the power were needlessly shut off during the working hours of the day, or the lights went out at night, or the subsistence department failed to provide suitable food and lodging for our workmen, and we would at once discover the causes for this industrial inefficiency; but if the class is made to wait while a visitor or an assistant detains us, we may have little remorse, or indeed thought, concerning our academic inefficiency. To attend an engineering college it costs a student at least one dollar per week per credit hour of col-

lege work, or from sixteen to twenty dollars per week. If therefore the teacher in a college of engineering is absent without a substitute from a one-hour class-room engagement, it may be causing each of the ten to two hundred students to spend a dollar in needlessly trying to fulfill his part of the contract with the institution. The same is true of inexcusable latenesses.

A good teacher is one who has an unimpeached and deserved reputation for mental honesty, right living, patience under harassment, and sound character. The engineering teacher who describes tricks of the trade, petty dishonesties, evasions of both the spirit and the letter of the law, without showing at least his disapproval of them, who shuts his eyes to dishonesties in class-room and college life is neither a good teacher nor yet a good citizen. The teacher who is a leader in trickery, deceit, and bluff during the term and who permits students to sit in an examination room so close together as to be under constant temptation to undesired dishonesty is particeps criminis to any dereliction of the student then, and possibly later. When cheating in examinations is made a sine qua non for honors and high grades, if not for graduation, and when the most skillful compiler of invisible ponies and the most successful cheater becomes the honor man of the class, as I have heard reported in recent trips among the colleges, it would seem that an old fashioned course in moral philosophy and ethics should be in order for both the teachers and the students. We all fail, I fear, frequently enough, but we should not be forced, or allowed, to fail inordinately. Occasionally we hear condonation expressed at the human frailties of the teacher, because he is considered as a genius in his specialty, and on account of his lovable qualities. Far be it from me to cast stones at my brother man, but I have never been able to discover a reason why a drunkard, or a libertine, should be tolerated in the teaching profession and frowned out of society in other professions and not allowed to work where the physical well-being of others was involved. Surely the mental and the spiritual well-being of our young

men are paramount to their physical existence. The one moral trait which seems to be most frequently demanded above all others from the teacher is that of patience. Some of us do not enjoy walking with persons who walk slowly or with very short steps, and who take a long time to get over very little ground. Similarly, we have to go equally slowly in expounding a new problem to a class, or in drawing out of even the average student the principle underlying the problem in hand, and in causing him to think about the subject consecutively and logically. We have all asked ourselves at the end of the hour, "How many in that class really took in the full significance of what I was talking about?" If this is true with the average class, how much more is it so with those members who are lazy or are naturally slow in their mental operations?

From the above it follows as a matter of course that the good teacher should deserve the respect of his students and his colleagues as a man, as a teacher, and as an engineer. I think it frequently happens that the students know our failings and our strong points better than we do ourselves, or than they are known by our superiors. Student criticism may sometimes be unjust for want of full and complete information, but it must be remembered that the young human mind is likely to be as keen in its perceptions as is the older mind of the man who occupies the other end of the room.

Another requisite in the good teacher is unbounded enthusiasm for and intense loyalty to the work of the teacher and of the engineer. We can tolerate the hireling in the commercial office and the drafting room, and the time-server may have to be put up with out on the works and in the mine, but the teacher, as a leader of young men and as a man who should be looked up to with some degree of that kind of respect which may grow into veneration, should be so bubbling over with enthusiasm that it will be contagious.

That prince of cultured scientists, Dr. S. Weir Mitchell, in giving at the semi-centennial celebration of the foundation of the National Academy of Sciences some of his recollections

of the eminent men of science whom he had known, told the story of Professor Joseph Leidy's being asked if he never got tired of life. "Tired!" he said, "Not so long as there is an undescribed intestinal worm, or the riddle of a fossil bone or a rhizopod new to me." So, the enthusiastic teacher is never tired, so long as there is an intelligent boy to be trained or a mind to be developed. The engineer sets in motion the wheels of thousands of machines; the successful educator sets in motion the wheels of a thousand minds. Such a man can always get the work out of his students, even if they have to curtail the time properly due to some other instructor who is less inspiring. The enthusiastic teacher never counts the cost to himself of his labor for those whom he loves to call "His Boys".

I am of the opinion that our engineering colleges are less handicapped than are the academic colleges by the services of men who are teaching for a year or two either while studying for the bar or for holy orders, or to enable them to repay the debts contracted for their college education by the means which will permit the least effort during the shortest time. As a rule, the call to work in the bustle of the manufacturing and constructive world is preëminent in the mind of the engineering graduate. He is ready for the fray, and today he wants to get into it as never before, and no waiting until cooler weather or until after a summer vacation for him. "I am going to work next Monday," is his battle cry on commencement day. The courage of youth is beautiful to behold, and his zeal is a lesson to his teachers and to those who are following him.

Akin to enthusiasm for his work in the good teacher is his inspirational value to his students and his colleagues in the faculty. The former is the child of youth; the latter is the product of age and genius. When the teacher begins to lose his enthusiasm, he should begin to think that possibly he may be getting old, or else lazy. Not infrequently, however, the teacher who is devoid of enthusiasm may be of great inspirational value. He is the seer. He may be even halting

in his speech, but by his ideas, his skill, or his manner of presenting the subject he may impress the student with the greatness of the profession that he is studying and lead him on to larger visions. Fortunately, the world needs both draft horses and speed horses, otherwise some of them would have to be put out of the way. Similarly, it is a great comfort to some of us to think that possibly we are doing the work of the world for which we were created, even if we are not breathing out great ideas at every breath. All hail to the man, however, who has ideas and can cause others to adopt them, to lift the world up and into larger visions, and so to do bigger things for the benefit of mankind. Great men are not necessarily either enthusiastic or yet inspirational, and some of the poorest teachers under whom I have sat were great men in other lines of human endeavor. But I am sure we can all recall some one of our own teachers who was both a great man and a good teacher at the same time. But, may I not ask, was he not a good teacher because he was enthusiastic and insipirational, and had no thought of apologizing for being a teacher? The man who can never be a good teacher is he who is ashamed of his job, for to him it is most likely to be only the line of least effort to the pay-check.

The good teacher is he who has felt the thrill of having been called to the upbuilding of character in others, who day by day sees the unfolding of the innermost life of his fellow citizen, who has a life of service to live and enjoy, and who deals with human minds in the laboratory of life; for, after all, is not education only scientific research applied to character? Just as we go to the physician for the improvement of the body, and to the priest for the betterment of the human soul so we should go to the good teacher for the training in character which the young all need in different degrees. One of the inspiring sights of the college year and the one which always gives me a genuine thrill of happiness is on commencement day to look over the sea of upturned faces of men and women who have just been graduated and feel that we have been in some small degree a party to their training and

responsible for their future success in the battle of life and in the part that they will hereafter play, for weal or for woe, as our fellow citizens in this republic. In their promise of success is our joy and reward for a year of hard work. But for the joy of service, some of us would not be willing parties to what the Governor of Ohio recently described as "the scandal of low salaries paid to college professors". I sometimes think that school boards and trustees occasionally take advantage of the idealism of the teacher to get his services below the proper market rate; and this is especially true of engineering teachers who in most cases can, and sometimes do, earn more money from their clients during a part of the year than they receive from their professorship during the major portion of the year. All the pay of the good teacher does not come inside the pay envelope. Much of it comes in that inward consciousness of work well done in the training for citizenship, for that efficiency which will prevent poverty, for success in whatever walk of life may be followed, and finally for the larger life here and hereafter. Someone has defined the professional class as the one that has no leisure, as instanced by the minister, the physician, and the lawyer. Judged by that standard, we, as teachers, belong to the professional class.

Probably some of you have been wondering why I have not as yet said anything about the good engineering teacher being above all other things a good engineer. That goes almost without saying in this presence, provided you mean the *best* teacher. The engineering teacher who has never practiced anything that he has taught, who has never seen built anything that he has designed, who has never prepared for an elaborate test of some plant or machine and found that he had foreseen all the various requirements in the way of labor, apparatus and equipment, even to the board and lodging of himself and his assistants, cannot expect to be considered as yet a really good engineering teacher. However, it must be remembered that as this is an educational society, and not an engineering or a technical society, as Dean Charles H. Benjamin has so aptly put it, so it must be remembered that

the colleges need men who to be teachers must be first able to impart their knowledge, draw out from their students all that is in them, and cultivate in them the habits of correct thinking, clear vision, active imagination, sound reasoning powers, and good judgment; and because they possess these things themselves and can train others in them, they are therefore fit to be counted among the good teachers. It is for these reasons that good engineering teachers are said to be more difficult to find than are good teachers of other subjects.

A good engineering teacher must know what engineering really is. He must have clearly defined ideas on what are the distinguishing features of engineering, technical, manual training, trade school, and industrial educations. He must have no half-hearted ideas as to where the engineering trades stop and where the profession begins. He must not be afraid to get out into the deep water of the profession of engineering. He must not believe that the proper engineering education is strictly utilitarian and vocational, and not one bit cultural. He must look between the folds of the ancient armor of his colleague in the college of arts of his institution, and discover that the scientific spirit has largely superseded the literary spirit even in such subjects as Latin, Greek, and the modern languages; that in fact in the work of some language teachers there is more of science than of language; that the so-called literary colleges are training men for vocations just as truly as are our colleges of engineering, law, and medicine; that while the old-time classical colleges used to train men to be gentlemen, their successors in the educational world train men for journalism, insurance, politics, trade, and business, as well as for education, the law, and the ministry as heretofore. We engineers think that they are to be congratulated. in that they have enlarged their system of education and no longer make it so general as to fit the student for nothing in particular and so non-technical as to be useless except as a preparation for one of the professions.

" To know the best that has been thought and said in the

world'' is what Matthew Arnold calls culture. To the engineer, this is not the fullness of culture, but the rather to know the best that other men have thought, and said and done. Even this is only half of the full duty of a cultured engineer. He should not only know the best that others have thought, and said and done, but he should, as far as he may be mentally able, have contributed to the thought, and writings, and doings of the world. The engineering, above all other professions, demands that its members shall not be solely scholars, nor yet students of unsolved problems, but they shall have solved some of the problems which have pressed upon civilization for solution. Engineering teachers should be not scholars solely, nor yet students only, but pioneers and creators in the work of civilization. The first live in the spiritual palace called a library, where time, memory, and the receptive faculties are alone required. The student lives in the laboratory where the powers of observation are developed, logic reigns, and laws are discovered. The successful engineer lives on the frontier of civilization, on the firing line of human endeavor, where those material problems have to be solved that have been set for the ages, and where the art of creation is wedded to the science of industry. The scholar deals with the past. The student lives in the present. The engineer looks into the future and solves its problems.

To be a good engineering teacher, one must be something of a scholar, student, and creator, and, highest of all, an educator capable of leading others to be the same. Such men are necessarily scarce, and while their financial rewards may be small, the satisfaction that they very properly get from their work transcends all their many self-denials and enables them to hold their heads up with the world's best people.

This society was formed for the promotion of the kind of education which has been described. This is its twenty-first annual meeting. It may be now said to be of age. In closing this address I desire to leave with the next program com-

mittee and the incoming officers just two suggestions with the hope that they may be possible of adoption.

Let the program next year include a rousing session on "Education as a Science, rather than as an Art". Those of you who are familiar with the proceedings of the society know that we have had the subject of education considered as an art dealt with from many points of view. Until this meeting, little, if anything, has been done to consider the rationale and science of our chosen profession of education. Let the best minds in the educational world tell us, and in a practical way, all that time will permit concerning the science of education, including its psychology as applied to engineering education. Schools of salesmanship have their special courses in the psychology of their chosen vocation; but did any one ever hear of a course in psychology being demanded as a part of the necessary training required for the engineering teacher? As training and instruction in the normal school are required of grammar school teachers, and as graduation from a college of arts or of education is expected or demanded from the would-be high school teacher, and since successful courses are given in our colleges of education on how to teach mathematics, chemistry, and physics, surely courses are needed on how to teach the applications of these subjects. Hence I claim that some professional training in education should be required of the man who desires to impart his knowledge and to train young men for the practice of the engineering profession. We are engineering educators. Why should we be required to possess much professional knowledge and training in engineering and none in education?

And this leads me to my last suggestion which is that the faculties of some of those universities which maintain both colleges of engineering and of education should offer in their summer terms strong courses of study in psychology and in education considered both as a science and as an art. These should be conducted by their most virile and experienced men, and college presidents, deans and heads of departments should

be requested to influence their younger assistants and fresh graduates who expect to go permanently into the work of education to take these proposed courses of study in the summer term in preparation for their work in the college of engineering in the succeeding year. If this is done, more engineering teachers will become engineering educators.